Synthetic microbial consortia-based platform for flavonoids production using synthetic biology

PROJECT DETAILS

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Sub-Programme: Industrial Leadership
Funding Scheme: Research and Innovation Action

Project Reference (Grant Agreement Number): 814650
Project Duration: 50 months (from 2019-01-01 to 2023-02-28)

Total Project Budget: € 7.371.051'25
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UniOvi Budget: € 628.985'00

Website: https://synbio4flav.eu/

CORDIS link: https://cordis.europa.eu/project/id/814650

PROJECT DESCRIPTION

This Project pursues the implementation of a standardized pipeline for surrogate production of plant flavonoids in synthetic microbial consortia (SMCs) by means of standardization and systems-guided assembly of highly complex biological devices. Flavonoids are the more abundant and consumed group of phytonutrients, used in numerous applications including functional food & beverages, dietary supplements, cosmetics, and pharmaceuticals. Despite its growing demand, flavonoids production remains elusive to chemical synthesis and biotech-based approaches, thus current flavonoid market is constrained to the scarce plant-based sources. These compounds are synthetized in nature through complex pathways involving an intense chemicals trafficking through plant compartments. By facilitating component troubleshooting and re-usability—instead of optimizing a single whole-cell biocatalyst— SynBio4Flav will recreate such non-homogeneous scenario by breaking-down specific portions of the complexes and highly regulated biochemical routes between different microbial species, each of them genetically programmed to deliver an optimal output of the corresponding biosynthetic step(s) i.e. through a distributed catalysis engineered in a defined SMC. Enabling such novel approach, SynBio4Flav will push the existing boundaries of the synthetic biology by acting along the whole Synthetic Biology hierarchy abstraction, and remarkably, in those with high complexity level e.g. cell systems and microbial communities. By creating libraries of optimized cell systems programmed to deliver an optimal output, and novel synthetic biology tools for cell systems assembling into 3D SMCs, SysBio4Flav will reach a TRL5 in production of natural and new-to-nature glycosylated flavonoids. The durable output of SynBio4Flav will be a standardized platform containing hundreds of optimal cell systems for exploring the full combinatorial space of flavonoids biosynthesis, including thousands of new-to-nature analogues.

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